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Questionnaire on methods used to disinfect insect-infested plants

which are subject to quarantine and inspection regulations.

At the request of the Western Plant Quarantine Board, the Bureau of Entomology is attempting to compile and publish the available information upon methods and materials used to disinfect nursery stock, bulbs, fresh and dried fruits, seeds, cereals and other materials infested with insects which are subject to National and State quarantine and inspection regulations.

The purpose of this publication is to present a digest of the methods used by the State and Federal agencies in treating various plants and plant products with a view to establishing greater uniformity of treatment. It is also believed that such a publication will point out the weaknesses and indicate lines of research which will lead to the improvement of these methods.

In order that this publication may represent the latest information upon the procedures used by State agencies as well as the Federal Government, you are kindly requested to answer as fully as possible the questions asked below. Please give the names of the insects and the materials attacked in each instance and add any additional information upon methods or requirements not requested here which you consider important. Please also send any literature, whether printed, mimeographed, or typewritten, covering methods and requirements in the region under your jurisdiction. If the literature is not now available, references to the same will be greatly appreciated.

It is important to know whether a treatment is designed to disinfect plants or other products that are heavily or lightly infested with insects. For example, one type of treatment may be used for nursery stock heavily encrusted with scale whereas another type may be used on stock from which all infested trees have been removed, the treatment being given to kill any insects which may have been overlooked.

Please address all correspondence concerning this questionnaire to C. H. Richardson, Bureau of Entomology, Washington, D. C.

1. Hydrocyanic acid gas fumigation

a. Pot method (sodium cyanide or potassium cyanide and sulphuric acid).

(1) What dosages per 100 cu. ft. do you advise for various species of insects and plants or plant products?

(2) What quantity of acid and water do you require to generate the gas?

(3) Length of exposure for various insects and plants or plant products

(4) Do you specify the temperature and humidity conditions under which fumigation must be done?

(5) Condition of plants or plant products (soil on roots, foliage on plants, etc.)

(6) Apparatus used

(7) Procedure

(8) Approximate cost of treatment

b. Liquid hydrocyanic acid method

(1) Dosage for various insects and plants, etc.

(2) Exposure

(3) Temperature and humidity conditions specified

(4) Apparatus (applicators, etc.)

(5) Condition of plants or plant products (soil on roots, foliage on plants, etc.)

(6) Procedure

(7) Approximate cost of treatment

c. Calcium cyanide dust methods.

(1) Dosage for various insects, plants and plant products

(2) Kind of dust specified

(3) Exposure

(4) Temperature and humidity conditions specified

(5) Condition of plants and plant products

(6) Apparatus (dusters, etc.)

(7) Procedure

(8) Approximate cost

d. Vacuum fumigation with hydrocyanic acid gas

(1) Vacuum used (in inches)

(2) Dosage

(3) Exposure to gas:

(a) At atmospheric pressure

(b) In vacuum

(4) Temperature and moisture conditions

(5) Condition of plants or plant products

(6) Apparatus, including gasifiers, safety devices, etc.

(7) Procedure

(8) Approximate cost of treatment

e. Other compounds or mixtures which produce hydrocyanic acid gas (zyklon, etc.) (Please follow the forms given above.)

2. Carbon disulphide fumigation

a. Vaporization in closed chamber

(1) Dosage for various insects and products

(2) Exposure to gas:

(a) At atmospheric pressure

(b) In vacuum

(3) Temperature and humidity conditions specified

(4) What do you specify in regard to condition of the products?

(5) What do you specify in regard to fire hazards?

(6) Apparatus used (gasifiers, etc)

(7) Procedure

(8) How do you handle material after treatment?

(9) Approximate cost

- b. Application of emulsified carbon disulphide in open
 - (1) Composition of concentrated emulsion
 - (2) Dilution in terms of carbon disulphide for various insects and plants
 - (3) Volume of solution applied to definite area
 - (4) Temperature and moisture conditions

(5) How deep does the dosage penetrate?

(6) How are the plants handled?

(7) Apparatus

(8) Procedure

(9) Approximate cost

c. Carbon disulphide dips

- (1) Composition of concentrated emulsion
- (2) Dilution in terms of percent of carbon disulphide for various insects and plants
- (3) Volume of solution in respect of volume of immersed products
- (4) Temperature conditions
- (5) Period of immersion

(6) How are plants handled?

(7) Condition of products before treatment

(8) Apparatus

(9) Procedure

(10) Approximate cost

3. Other fumigants

Paradichlorobenzene, chloropicrin, naphthalene, carbon tetrachloride, sulphur dioxide, etc. Please describe the methods with reference to dosage, exposure, temperature, humidity, etc., and give procedure and cost of treatment. State precautions against fire hazards, if any.

4. Lime sulphur dips for plants

a. State dilution used in terms of some specified stock solution for various insects and plants.

- b. Volume of solution with respect to size and number of plants dipped in the same solution
- c. Length of time plants should be immersed
- d. Condition of plants before treatment (soil on roots, foliage on plants, etc.)
- e. Apparatus
- f. Procedure
- g. Approximate cost

5. Nicotine dips for plants.

- a. Kind of nicotine concentrate specified (nicotine sulphate or "free" nicotine solution)
- b. Dilution specified in terms of a specified nicotine concentrate for various insects and plants
- c. Volume of solution used in respect of size and number of plants dipped in the same solution.
- d. Quantity and kind of soap or other material, if any, required to be present in the nicotine solution
- e. Condition of plants before treatment
- f. Apparatus
- g. Procedure
- h. Approximate cost

6. Soap dips for plants

a. Kind of soap specified for various insects and plants

b. Dilution required in terms of weight of soap per gallon of dip

c. Volume of soap solution with respect to size of plant and number of plants dipped in the same solution

d. Condition of plants before treatment

e. Apparatus

f. Procedure

g. Approximate cost

7. Petroleum oil emulsion dips for plants

a. Kind of petroleum oil specified

b. Emulsion formula

c. Dilution required in per cent of oil for various insects and plants

d. Volume of dilute emulsion with respect to size and number of plants dipped in the same solution.

e. Condition of plants before treatment

f. Apparatus

g. Procedure

h. Approximate cost

.8. Other dips

9. Sprays

a. Lime sulphur spray

- (1) Strength of concentrate in degrees Baume' or specific gravity
- (2) Dilution of concentrate in terms of gallons per 100 gallons of spray mixture for various species of insects and plants
- (3) Volume of solution used with respect to size and number of plants sprayed
- (4) Condition of plants before treatment
- (5) Apparatus

(6) Procedure

(7) Approximate cost

b. Nicotine spray

- (1) Kind of nicotine concentrate specified (nicotine sulphate or "free" nicotine solution)
- (2) Dilution specified in terms of a specified nicotine concentrate for various species of insects and plants
- (3) Volume of solution used with respect to size and number of plants sprayed
- (4) Quantity and kind of soap or another material required to be present in the spray solution.

(5) Condition of plants before treatment

(6) Apparatus

(7) Procedure

(8) Approximate cost

c. Soap sprays

(1) Kind of soap specified for various insects and plants

(2) Dilution in terms of weight of soap per gallon
of spray solution

(3) Volume of solution used with respect to size and number of plants sprayed

(4) Condition of plants before treatment

(5) Apparatus

(6) Procedure

(7) Approximate cost

d. Petroleum oil emulsion sprays

(1) Kind of oil specified

(2) Emulsion formula

(3) Dilution required in per cent of oil for various insects and plants

(4) Volume of dilute emulsion used with respect to size and number of plants treated

(5) Condition of plants before treatment

(6) Apparatus

(7) Procedure

(8) Approximate cost

10. Other sprays

11. Heat treatments

a. Dry heat treatment

Describe methods, apparatus, etc.

b. Steam sterilizing treatment

(1) Seed bed and soil treatment

(a) Temperature and pressure used

(b) Length of exposure

(c) Condition of soil before treatment

(d) Apparatus

(e) Procedure

(f) Cost of treatment

(2) Steam treatment of broom corn, burlap sacking, etc.

Describe methods, apparatus, etc.

c. Hot water treatment

(1) Temperature requirements for various crops and
insects (bulbs, ornamental plants, sugar cane, etc.)

(2) Length of treatment

(3) Condition of material before treatment.

(4) Handling treated material after treatment

(5) Apparatus (temperature control devices, sources of heat, agitators, insulation, capacity, etc.)

(6) Procedure

(7) Cost of treatment

